Assessing the Efficacy of Fish Presence and Species Composition at GIS-Derived Stream-Road Crossings in two Low Gradient Headwater Streams in Downeast Maine

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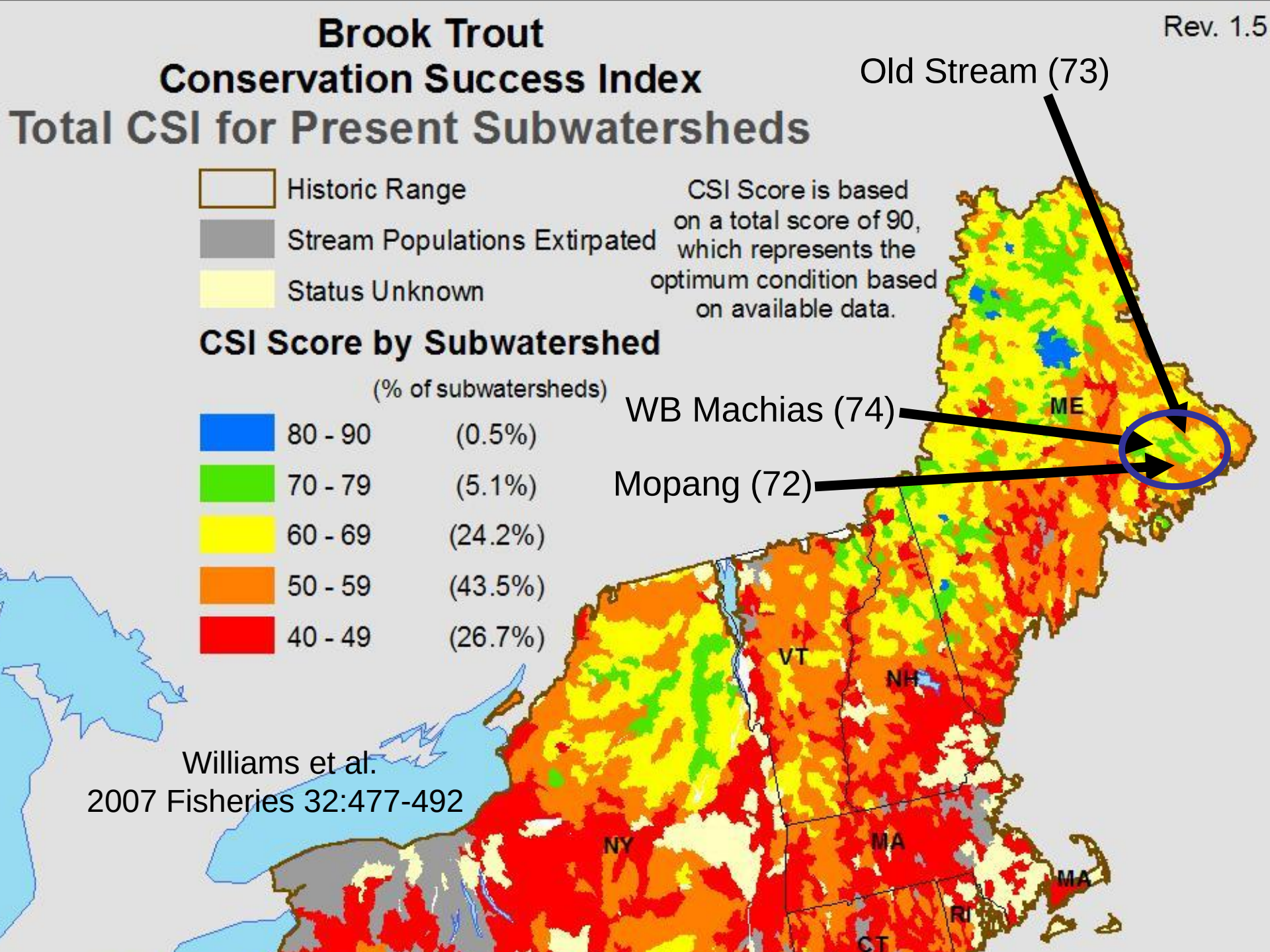
Brook Trout
Conservation Success Index
Total CSI for Present Subwatersheds

Rev. 1.5



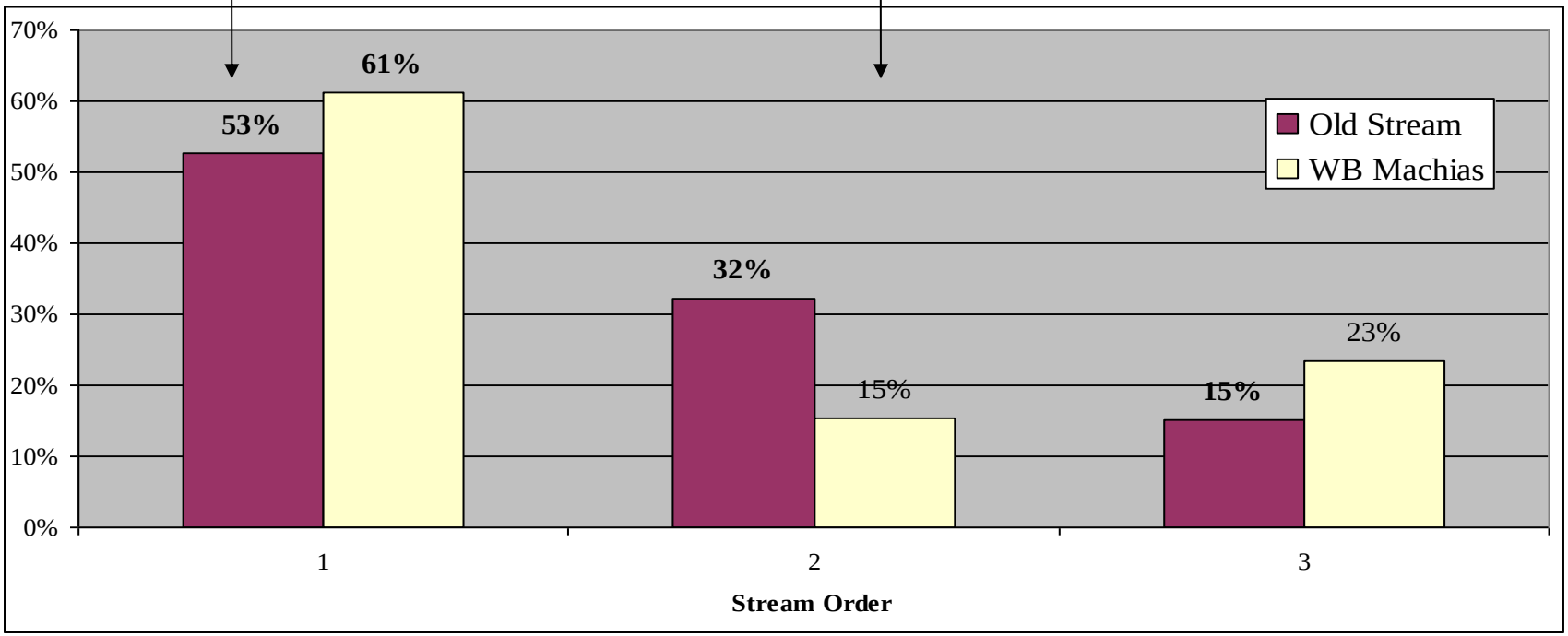
Williams et al.
2007 Fisheries 32:477-492

Upper Machias River Study Area's

	Drainage		Drainage Density	Elevation (m)			Length	
	mi2	km2	km/km2	Max	Min	Gain	(km)	Gradient
WB Machias	50.0	129.5	0.81	292	80	212	21.0	1.0%
Old Stream	29.1	75.4	0.96	194	52	142	16.6	0.9%

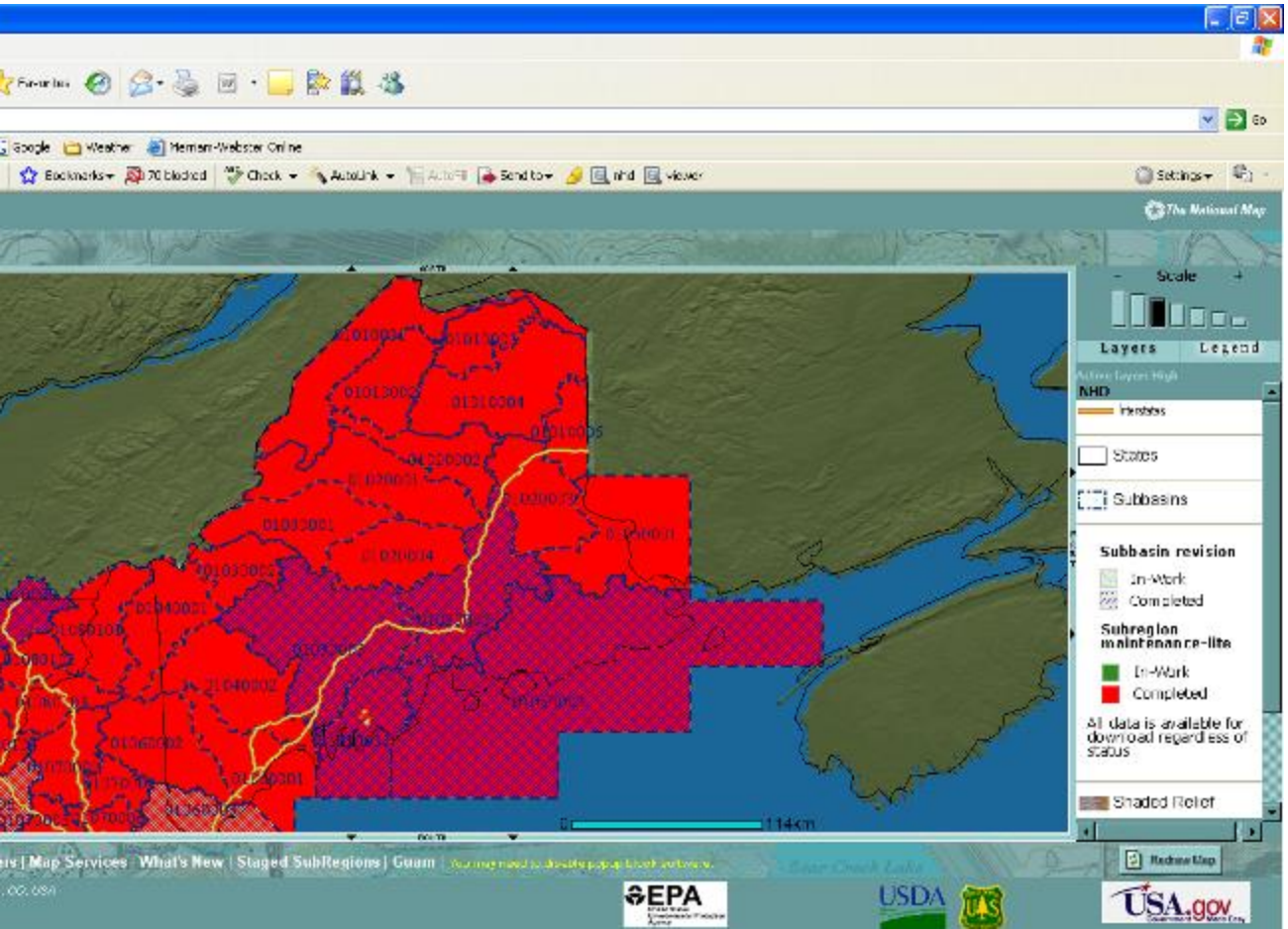
Dendritic drainage > 1.0

~80% are
1st + 2nd Order

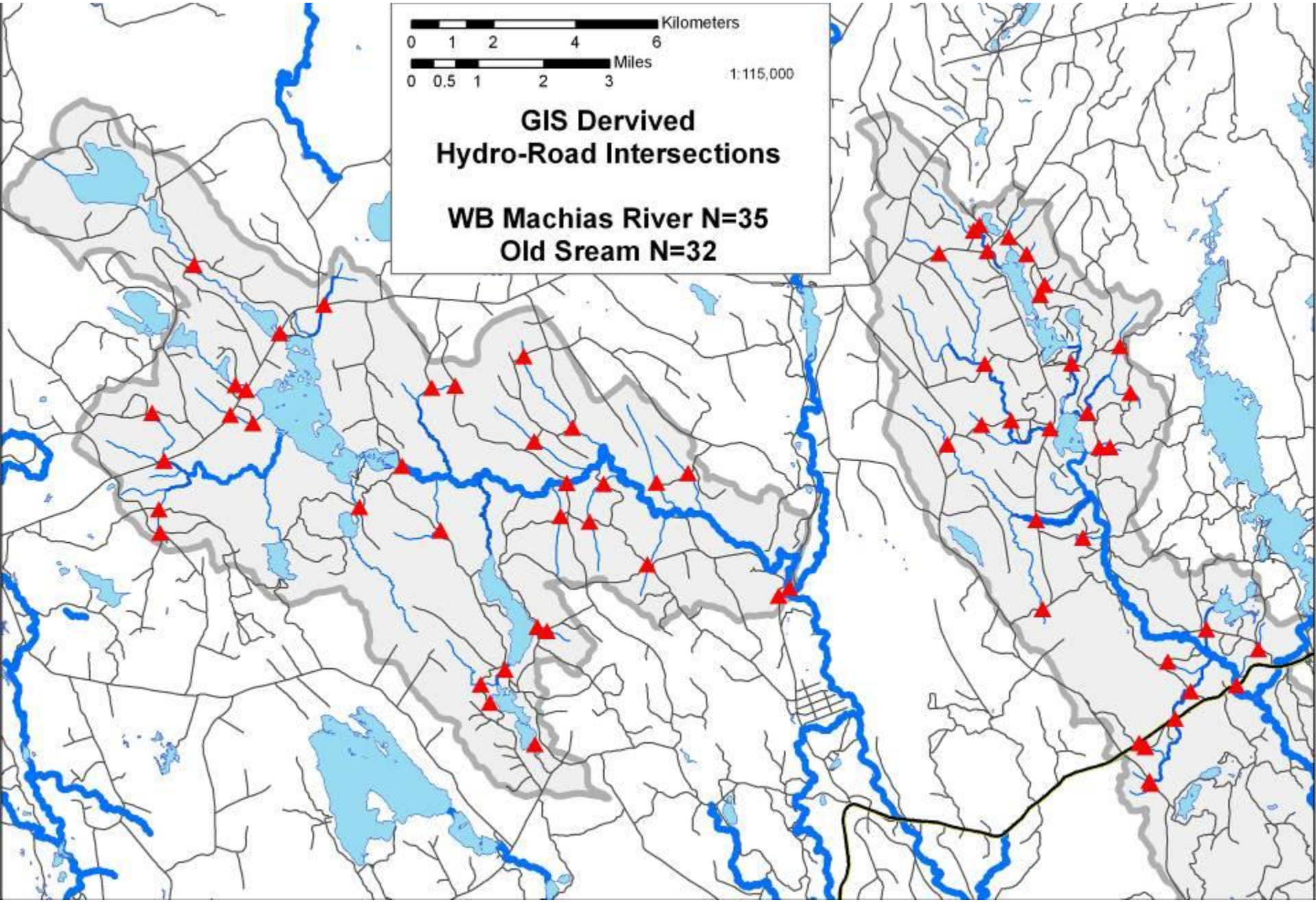


GIS Layers:

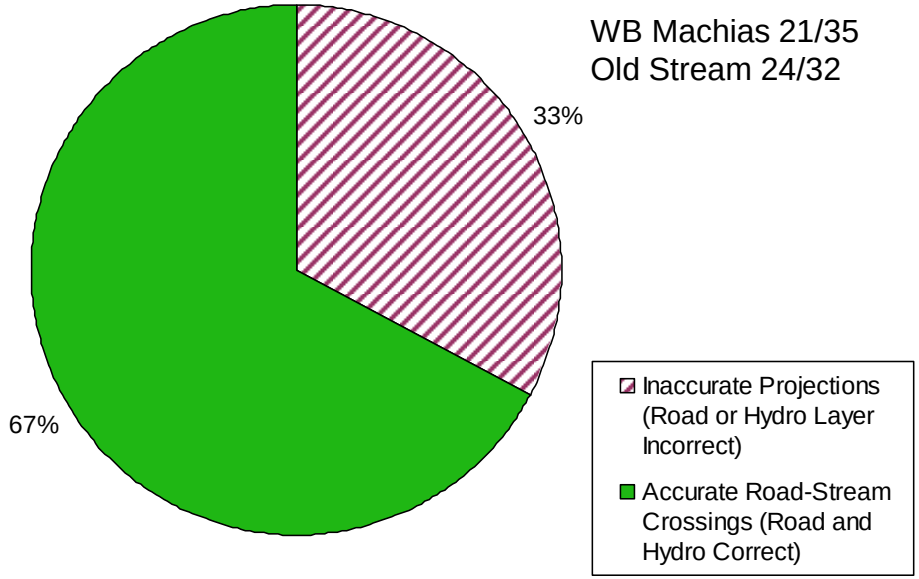
Hydro: http://nhd.usgs.gov/data.html Hydrologic Unit 01050002
Road: http://megis.maine.gov/ Updated 1989



Arc GIS 9.2
Hawthes Tools Extension

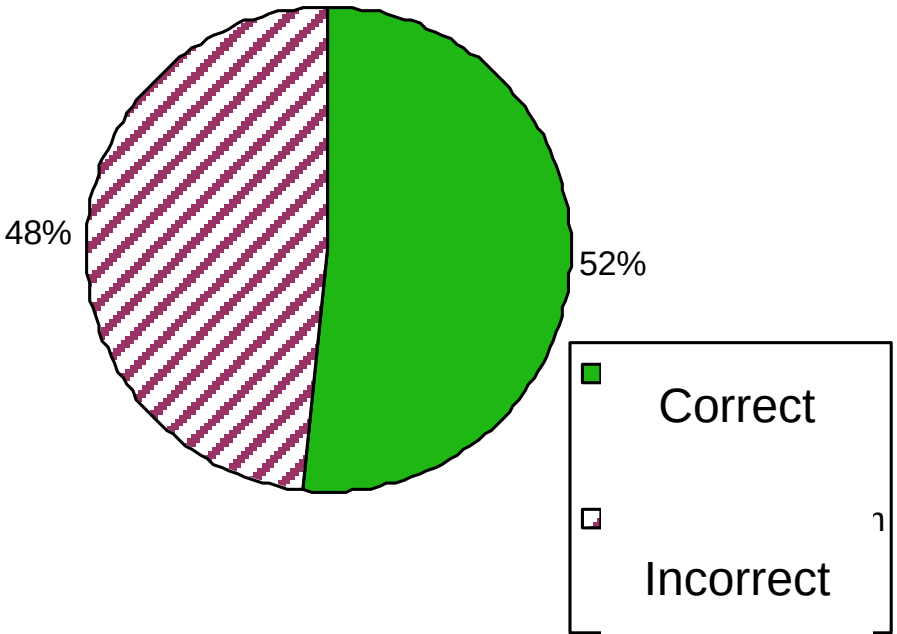

Kilometers
0 1 2 4 6
Miles
0 0.5 1 2 3
1:115,000
GIS Dervived
Hydro-Road Intersections
WB Machias River N=35
Old Sream N=32

Accuracy of GIS Road-Hydro Intersections

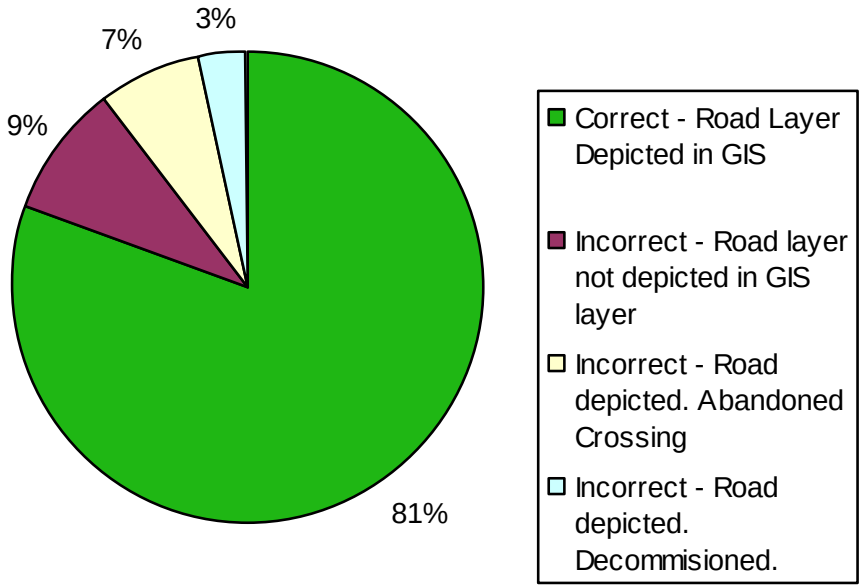


Where is the Problem-
"New" Hydro Layer?
or
"Old" Road Layer?

Hydro Layer

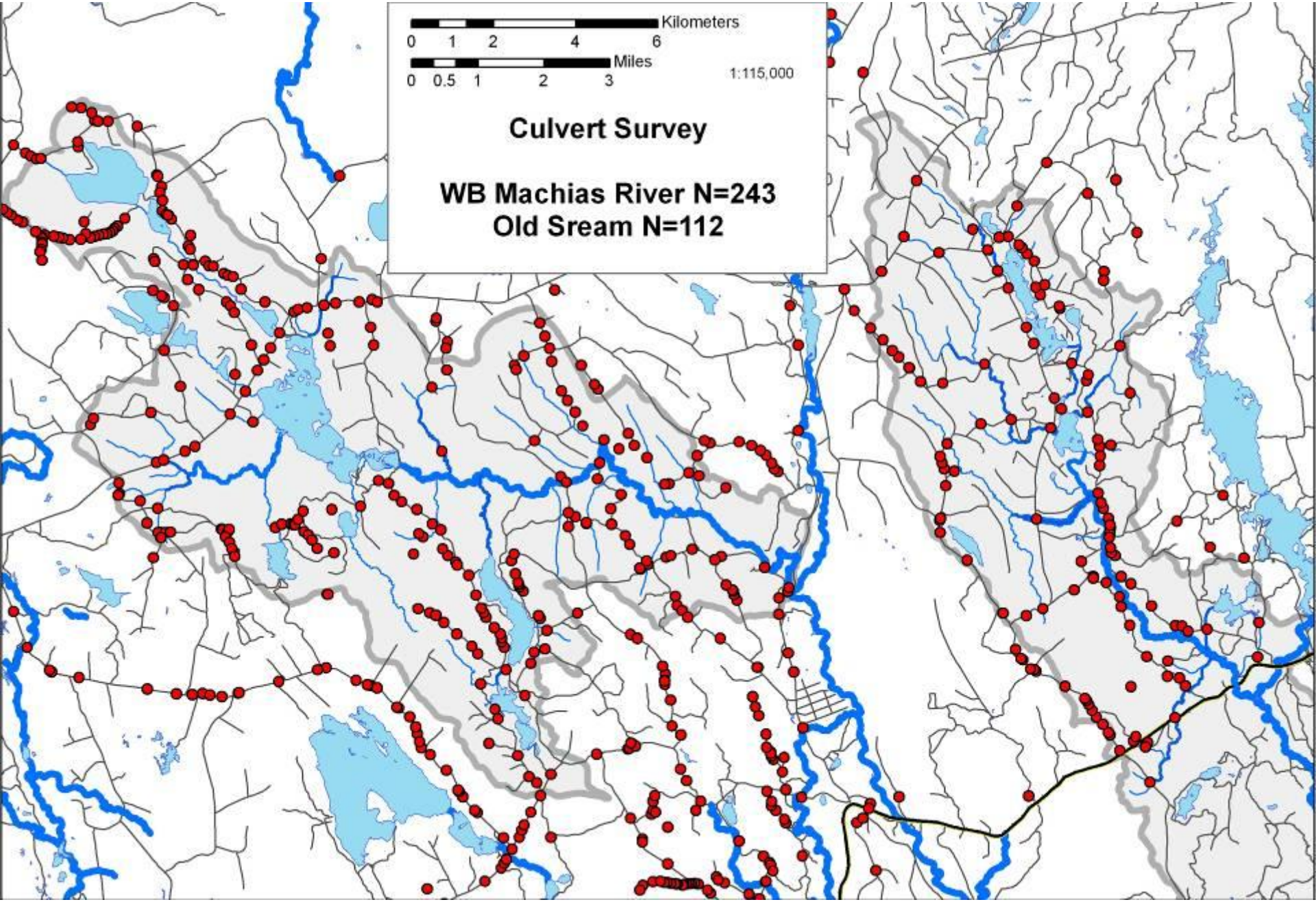


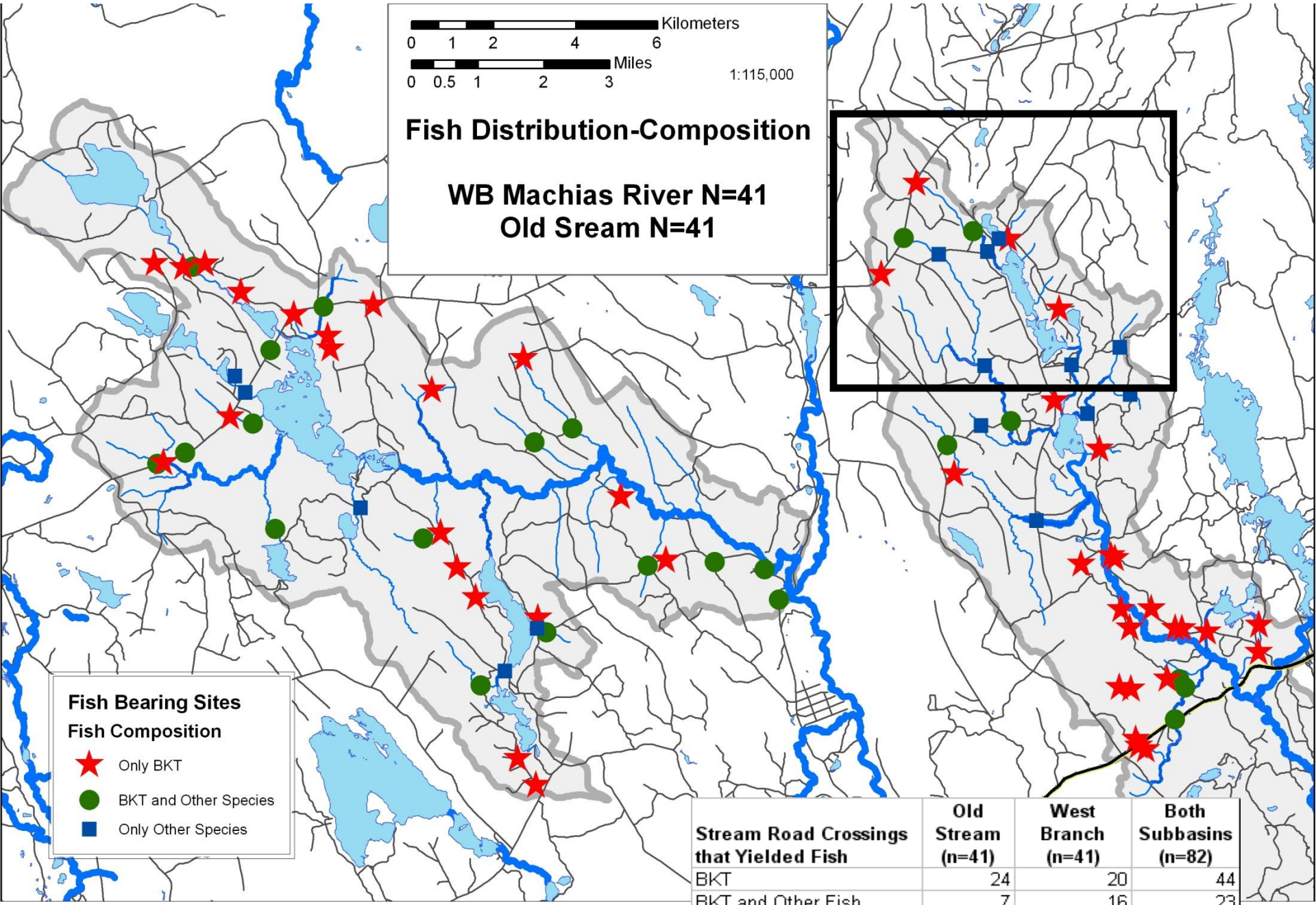
Road Layer



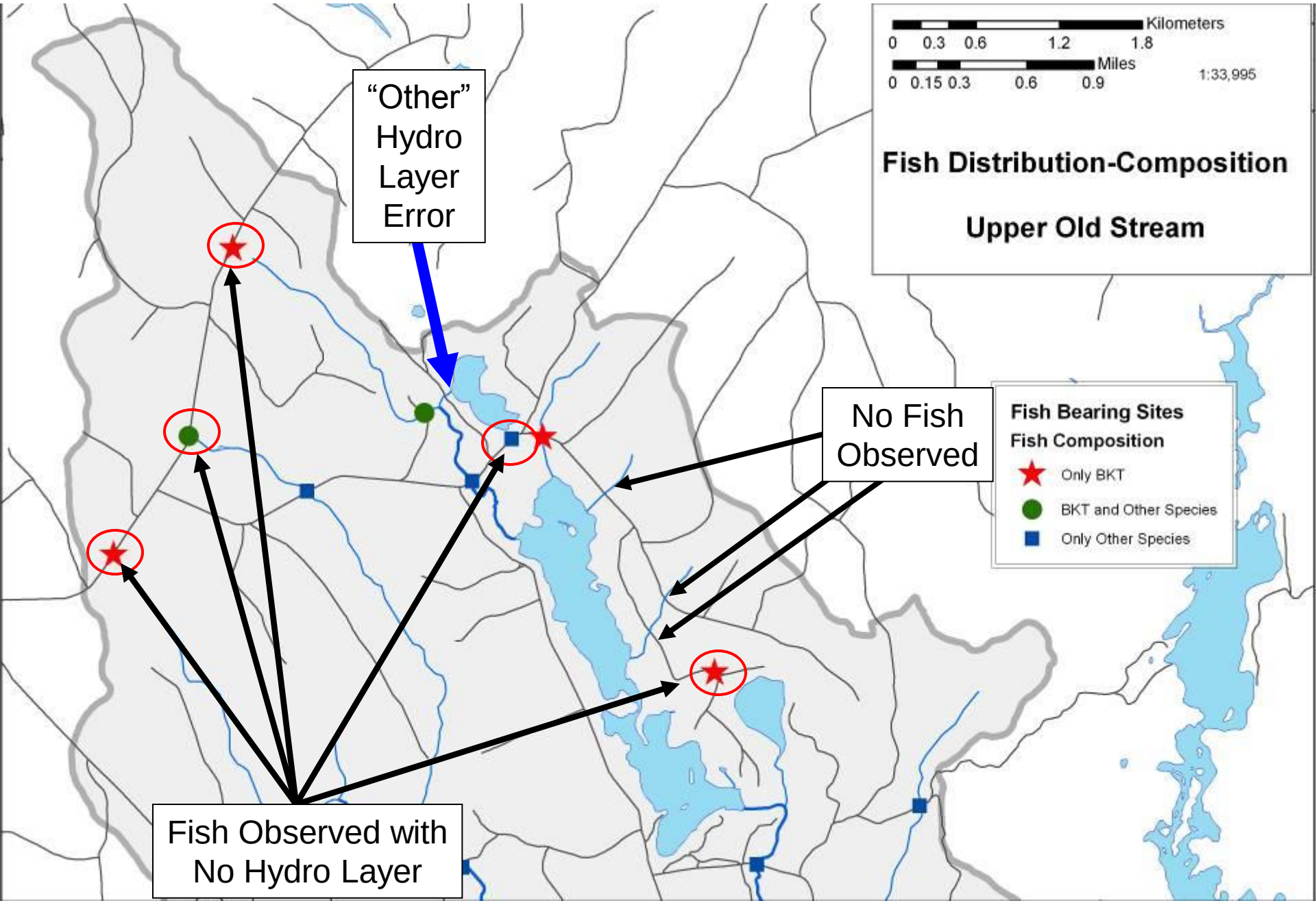
Field Methods:

- Stream-road crossings were determined by conducting comprehensive road surveys.
- Fish presence-absence, as well as species composition, was determined by one-pass electro-fishing surveys. 100m of habitat was surveyed above and below each crossing.
- Five stream-road crossings with watersheds >15.5 km^2 were excluded from species distribution comparisons (n=3 W.B. Machias and n=2 Old Stream)

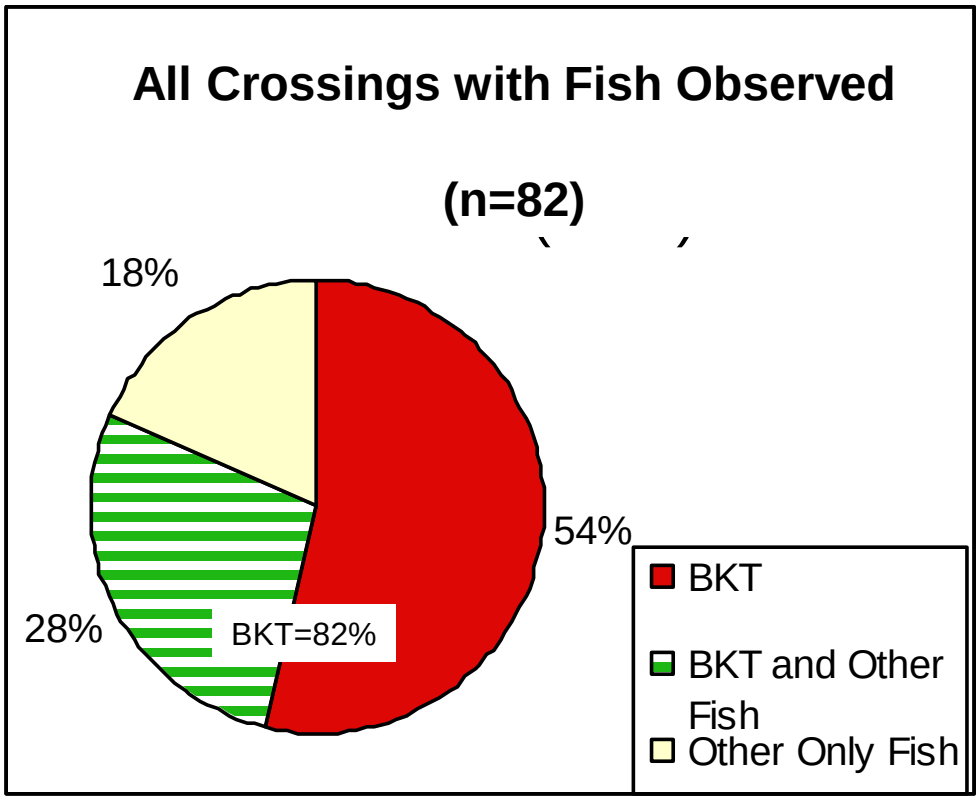

Kilometers
0 1 2 4 6
Miles
0 0.5 1 2 3
1:115,000
Culvert Survey
WB Machias River N=243
Old Sream N=112

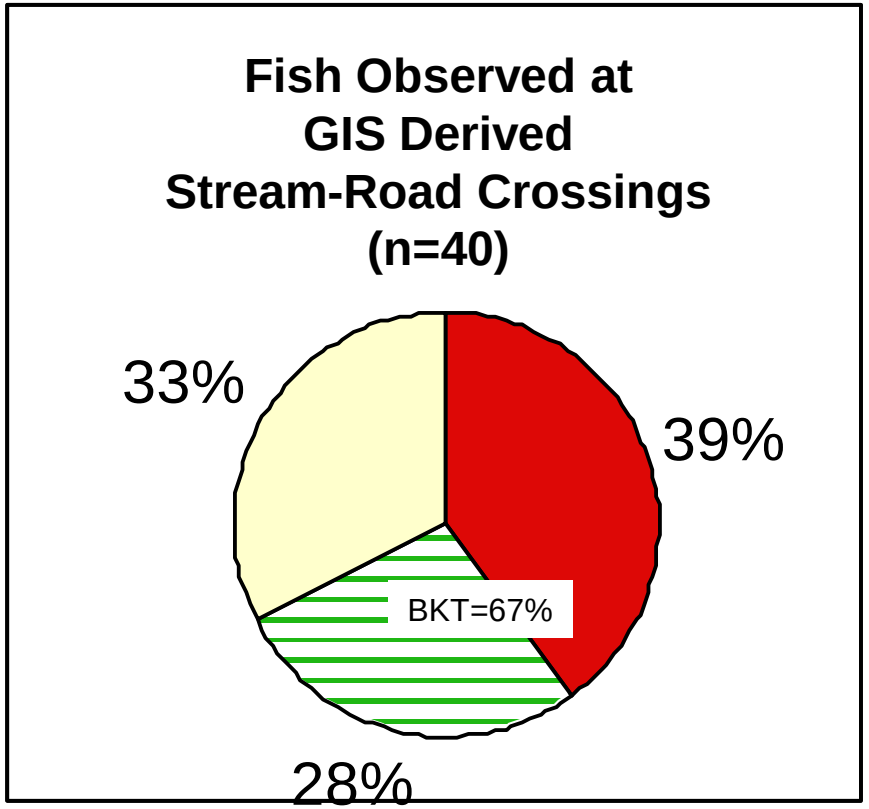


Stream Road Crossings that Yielded Fish	Old Stream (n=41)	West Branch (n=41)	Both Subbasins (n=82)
BKT	24	20	44
BKT and Other Fish	7	16	23
Other Only Fish	10	5	15


Kilometers
0 0.3 0.6 1.2 1.8
Miles
0 0.15 0.3 0.6 0.9
1:33,995
Fish Distribution-Composition
Upper Old Stream
"Other" Hydro Layer Error
No Fish Observed
Fish Bearing Sites
Fish Composition
Only BKT
BKT and Other Species
Only Other Species
Fish Observed with No Hydro Layer

Fish Composition
Observed vs. GIS-derived Crossings
Sites <15.5 km^2





Summary

-In Low Gradient Downeast Maine Rivers (HUC 01050002)-

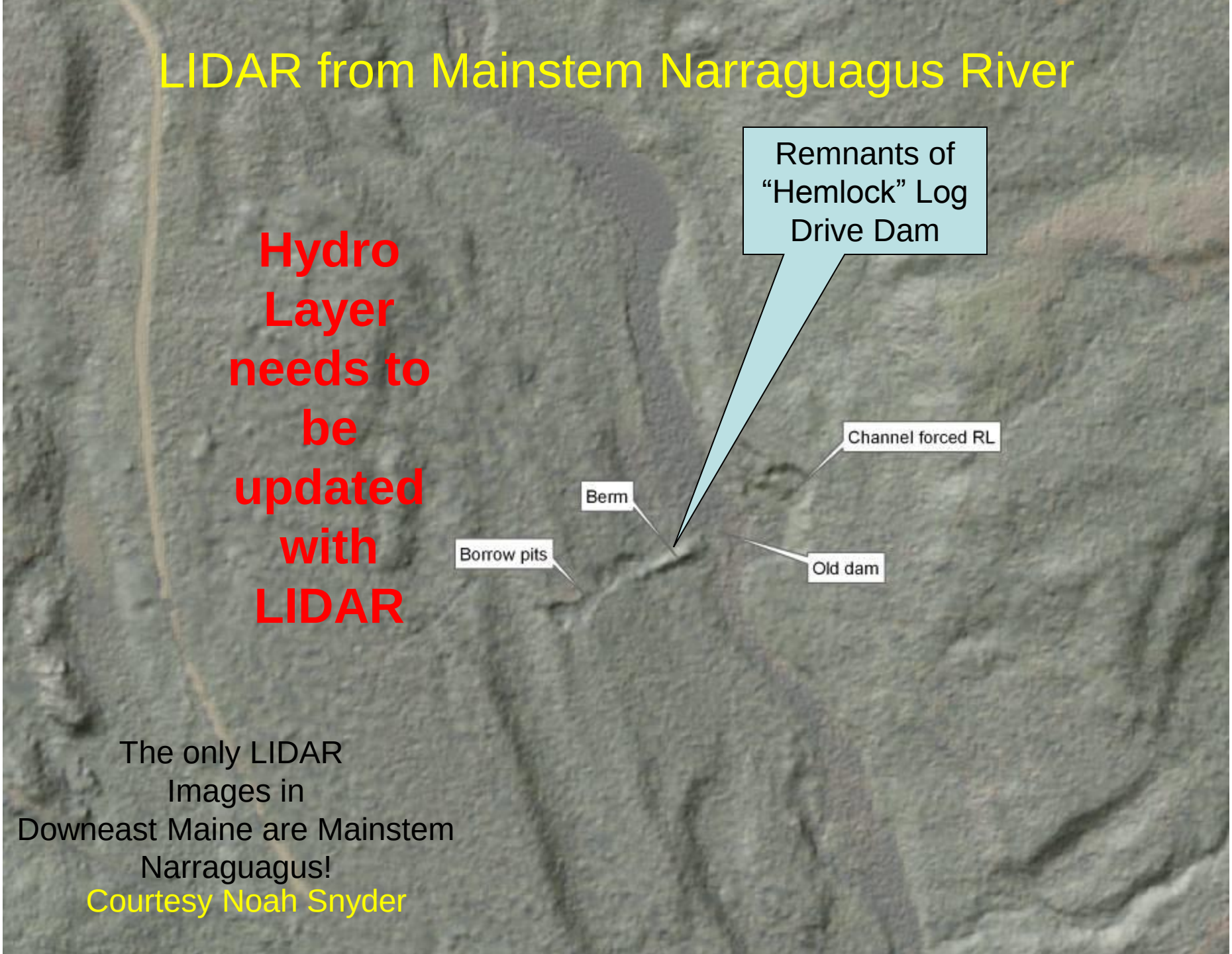
- Road Layer (1989) is quite reliable and accurate- 80-90%
- *~10% errors associated with road removals-abandonments*

- NHD Hydro Layer does a poor job in delineating fish habitat!
  - *Drainage Density values (stream length) are too low!*

  We could use LIDAR to improve the hydro layer!

- Relying on the NHD Hydro layer to assess Brook Trout Population Demographics will bias your results!

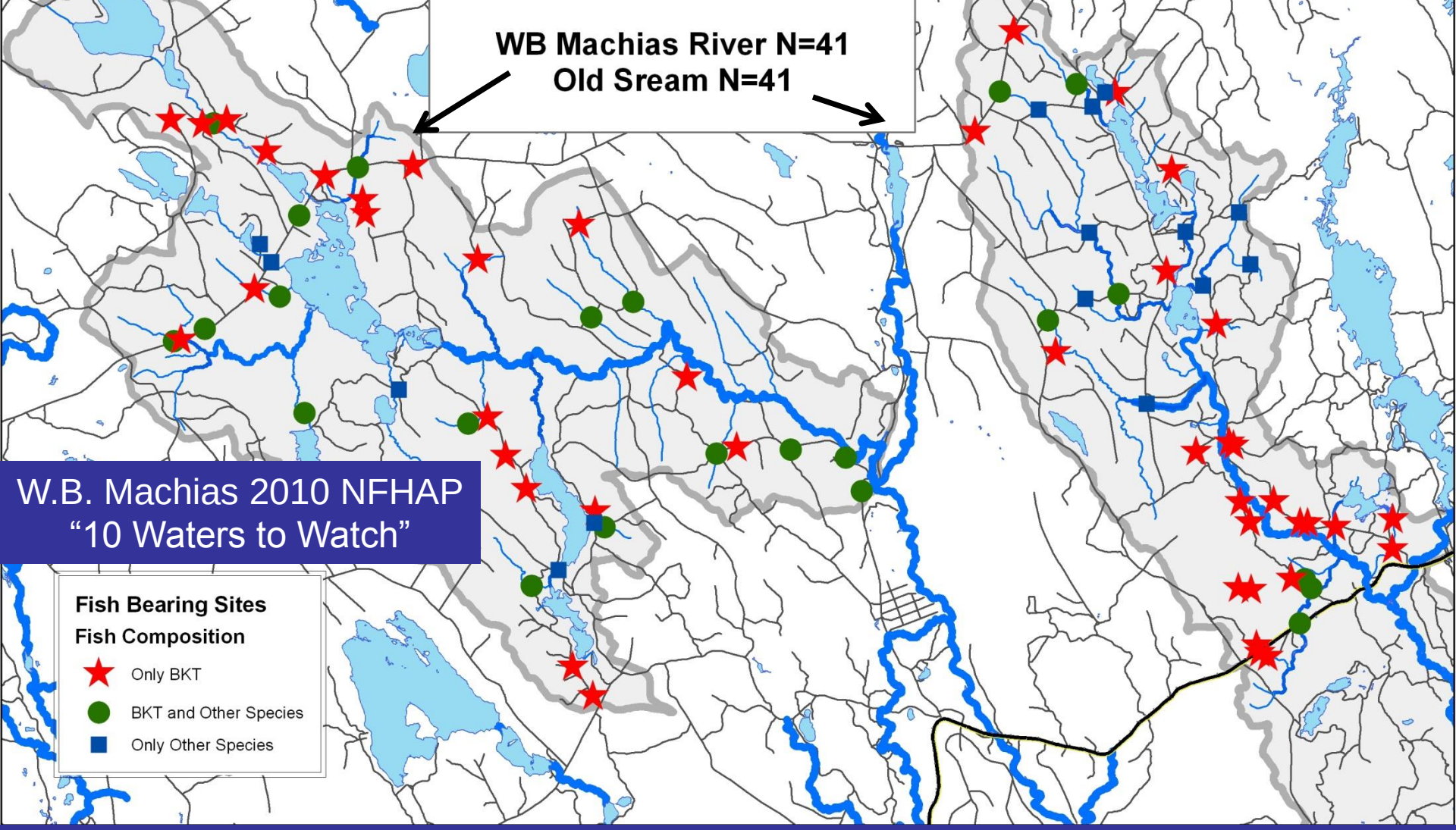
LIDAR from Mainstem Narraguagus River



Hydro Layer needs to be updated with LIDAR

The only LIDAR Images in Downeast Maine are Mainstem Narraguagus!

Courtesy Noah Snyder



Acknowledgements

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- Steve Koenig- Project SHARE